

(a) bleaching the chemical cellulose pulp in a first chlorine dioxide step, at a temperature over 70°C for less than 10 minutes and so as to provide a chlorine dioxide dosage of between about 0.5-1.5% active chlorine, and adjusting the pH of the pulp in the first chlorine dioxide step so that the final pH of the step is over 4; and then

(b) acid treating the chemical cellulose pulp at a pH of between 2 - 5 and at a temperature of over 80°C.

*pH 4.7 orig claim
can be in range of pH*

22. A method as recited in claim 21 wherein (a) is practiced so that the final pH of the first chlorine dioxide step is over 5, and so that hexenuronic acid groups in the pulp substantially do not react with chlorine dioxide.

23. A method as recited in claim 22 wherein (a) is further practiced so that the temperature in the first chlorine dioxide step is over 75°C.

24. A method as recited in claim 22 wherein (a) is further practiced so that the temperature in the first chlorine dioxide step is between about 80 - 100°C.

25. A method as recited in claim 24 wherein (a) is further practiced so that the treatment time in the first chlorine dioxide step is between 30 seconds - 3 minutes.

26. A method as recited in claim 21 further comprising, after (b), (c) bleaching the chemical cellulose pulp in a second chlorine dioxide step.

27. A method as recited in claim 26 wherein (a)-(c) are practiced so that the treatment temperatures in the first chlorine dioxide step, the acid treating step, and the second chlorine dioxide step, are substantially the same.

28. A method as recited in claim 26 wherein (c) is practiced so as to provide a chlorine dioxide dosage of between about 0.5-2.0% active chlorine during the practice of the second chlorine dioxide step.

29. A method as recited in claim 21 further comprising (c) treating the chemical cellulose pulp with chelating agent after (a) and (b).

30. A method as recited in claim 21 wherein (a) is further practiced so that the temperature in the first chlorine dioxide step is over 75°C.

31. A method as recited in claim 21 wherein (a) is further practiced so that the temperature in the first chlorine dioxide step is between about 80 - 100°C.

32. A method as recited in claim 21 wherein (a) is further practiced so that the treatment time in the first chlorine dioxide step is between 30 seconds - 3 minutes, and at a chlorine dioxide dosage of about 0.1-1.0% active chlorine..

33. A method as recited in claim 21 wherein step (b) is practiced at a pH between 2.5-4, a temperature between 90-110°C, and a time between 30-300 minutes.

34. A method as recited in claim 26 wherein (a) through (c) are practiced utilizing an acid tower, an inlet line to the acid tower, and an outlet line from the acid tower to a further treatment device; and wherein (a) is practiced substantially completely within the inlet line to the acid tower, (b) is practiced substantially completely within the acid tower, and (c) is practiced substantially completely in the discharge line from the acid tower.

35. A method of treating chemical cellulose pulp from an alkaline pulping process with chlorine dioxide comprising:

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(a) bleaching the chemical cellulose pulp in a first chlorine dioxide step, and adjusting the pH of the pulp in the first chlorine dioxide step so that the final pH of the step is over 5, and so that hexenuronic acid groups in the pulp substantially do not react with chlorine dioxide, and for a treatment time of between 30 seconds-three minutes; and then

(b) acid treating the chemical cellulose pulp at a pH of between 2 – 5 and at a temperature of over 80°C, for 30-300 minutes.

36. A method as recited in claim 35 further comprising, after (b), (c) bleaching the chemical cellulose pulp in a second chlorine dioxide step.

37. A method as recited in claim 36 wherein (a)-(c) are practiced so that the treatment temperatures in the first chlorine dioxide step, the acid treating step, and the second chlorine dioxide step, are substantially the same.

38. A method as recited in claim 36 wherein (a)-(c) are practiced so that the treatment temperatures in the first chlorine dioxide step, the acid treating step, and the second chlorine dioxide step, are substantially the same, and between about 90-100°C.

39. A method of treating chemical cellulose pulp from an alkaline pulping process with chlorine dioxide comprising:

(a) bleaching the chemical cellulose pulp in a first chlorine dioxide step, and adjusting the pH of the pulp in the first chlorine dioxide step so that the final pH of the step is over 4; and then

(b) acid treating the chemical cellulose pulp at a pH of between 2 – 5 and at a temperature of over 80°C for 30-300 minutes, and